

WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device comprising the steps of:

5 forming a non-single crystalline semiconductor film on a substrate having an insulating surface;

patterning said semiconductor film into a patterned semiconductor film having peripheral portions;

10 disposing a crystallization promoting material in contact with said semiconductor film either before or after said patterning, said crystallization promoting material containing a metal;

crystallizing said patterned semiconductor film provided with said crystallization promoting material by heating; and

etching the peripheral portions of said patterned semiconductor film after said crystallizing.

15 2. The method according to claim 1 wherein said non-single crystalline semiconductor film is amorphous.

3. The method according to claim 1 wherein said heating is carried out at 450-700°C.

20 4. The method according to claim 1 wherein said heating is carried out at 800-1100°C and said substrate is a quartz substrate.

5. The method according to claim 1 wherein said semiconductor film comprises silicon.

6. A method for manufacturing a semiconductor device comprising the steps of:

forming a non-single crystalline semiconductor film on a substrate having an insulating surface;

15 providing defects and/or stress in a selected region of said semiconductor film;

disposing a crystallization promoting material in contact with said semiconductor film, said crystallization promoting material containing a metal;

10 crystallizing said semiconductor film provided with said crystallization promoting material by heating wherein said metal segregates in said selected region during the crystallization; and etching said selected region after said crystallizing.

7. The method according to claim 6 wherein said non-single
15 crystalline semiconductor film is amorphous.

8. The method according to claim 6 wherein said heating is carried out at 450-700°C.

9. The method according to claim 6 wherein said heating is carried out at 800-1100°C and said substrate is a quartz substrate.

20 10. The method according to claim 6 wherein said defects and/or stress are provided by directing ions of phosphorous or oxygen into said selected region.

11. The method according to claim 6 wherein said semiconductor film comprises silicon.

12. A method for manufacturing a semiconductor device comprising the steps of:

5 forming a non-single crystalline semiconductor film on a substrate having an insulating surface;

providing defects and/or stress in a selected region of said semiconductor film;

10 disposing a crystallization promoting material in contact with said semiconductor film, said crystallization promoting material containing a metal;

crystallizing said semiconductor film provided with said crystallization promoting material by heating wherein said metal segregates in said selected region during the crystallization; and

15 forming an active region of said semiconductor device by etching at least said selected region after said crystallizing.

13. The method according to claim 12 wherein said non-single crystalline semiconductor film is amorphous.

14. The method according to claim 12 wherein said heating is
20 carried out at 450-700°C.

15. The method according to claim 12 wherein said heating is carried out at 800-1100°C and said substrate is a quartz substrate.

16. The method according to claim 12 wherein said defects and/or stress are provided by directing ions of phosphorous or oxygen into said selected region.

17. The method according to claim 12 wherein a distance d between
5 said selected region and a center of said active region is expressed by $D/30$ to D , where D is a dispersion distance of said metal.

18. The method according to claim 12 wherein said distance d is from $0.2 \mu\text{m}$ to $2 \mu\text{m}$.

19. The method according to claim 12 wherein said D is expressed
10 by $D_0 \exp(-\Delta E/kt)$.

20. The method according to claim 12 wherein said semiconductor film comprises silicon.

21. A method of manufacturing a semiconductor device comprising the steps of:

15 forming a non-single crystalline semiconductor film on an insulating surface;

directing ions of an element which is inert with respect to said semiconductor film into a selected region thereof;

20 disposing a crystallization promoting material in contact with said semiconductor film;

crystallizing said ~~semiconductor~~ film by heating wherein said metal segregates in said selected region during the crystallization; and forming an active region of said semiconductor device by removing at least said selected region by etching.